

CBSE Class 12 Chemistry 2022 - 56-6-2 - Compartment

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)



Time Allowed: 2 Hours

Maximum Marks: 35

General Instructions

- (i) This question paper contains **12 questions**. All questions are compulsory.
- (ii) The question paper is divided into three Sections: A, B and C.
- (iii) Section A: Questions 1 to 3 are very short answer questions, carrying 2 marks each.
- (iv) Section B: Questions 4 to 11 are short answer questions, carrying 3 marks each.
- (v) Section C: Question 12 is a case-based question, carrying 5 marks.
- (vi) Use of log tables and calculators is not allowed.

Section A

1. (a) For a reaction $R \rightarrow P$, half life ($t_{1/2}$) is independent of the initial concentration of reactants. What is the order of the reaction?

(b) Write one difference between order and molecularity of a reaction.

2. Answer the following questions (Any **two**):

(a) Define Molar Conductivity (Λ_m).

(b) Write the unit of Λ_m .

(c) How does Λ_m vary with concentration?

3. (a) Arrange the following compounds in the increasing order of their acidic character:

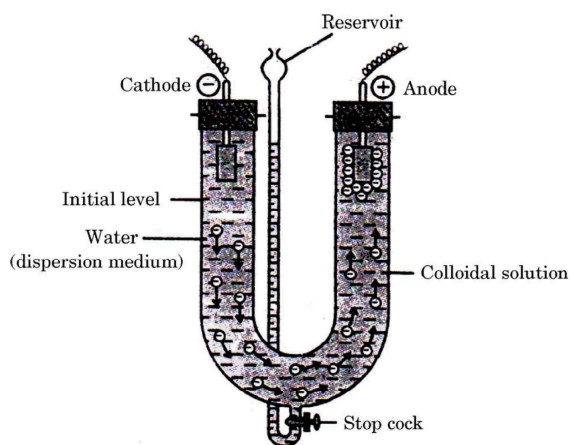
FCH_2COOH , NO_2CH_2COOH , C_6H_5COOH

(b) Write the IUPAC name of the given compound:

$CH_3-CH_2-CH_2-CHO$

4. The conductivity of 0.001 mol L^{-1} solution of acetic acid is $3.905 \times 10^{-5} \text{ S cm}^{-1}$. Calculate its molar conductivity. If Λ_m^0 for acetic acid is $390.5 \text{ S cm}^2 \text{ mol}^{-1}$, then calculate its degree of dissociation (α).

5(a). Answer the following questions on the basis of the given figure:



- Define the process depicted in the above figure.
- Can this process be used in the coagulation of the lyophobic sols?
- What is coagulation?

OR

5(b). Define the following terms:

- Adsorption
- Lyophobic sol
- Multimolecular colloid

6(a). (i) Which is the most common oxidation state in Lanthanoids?

(ii) Why is there a gradual decrease in the atomic sizes of transition metals in a series with increasing atomic numbers?

(iii) Calculate the number of unpaired electrons in the following gaseous ions: V^{3+} , Ti^{3+}

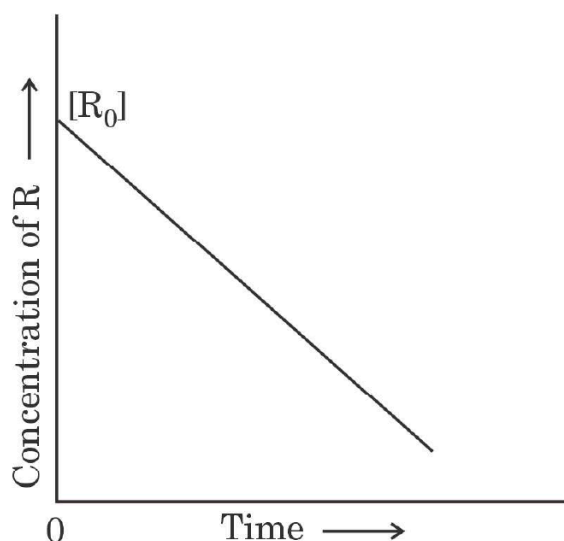
OR

6(b). (i) The electronic configuration of Ce is: ${}_{58}\text{Ce} = [\text{Xe}] 4f^1 5d^1 6s^2$. Calculate the spin only magnetic moment of Ce^{3+} ion.

(ii) Why is copper regarded as a transition element although copper atom has completely filled d-orbitals in its ground state?

(iii) Why is Sc^{3+} colourless in aqueous solution whereas Ti^{3+} is coloured?

7(a). The variation in the concentration (R) vs. time (t) plot is given below. Answer the following questions on the basis of the given figure:



- Predict the order of the reaction.
- What is the slope of the curve?
- What are the units of the rate constant k ?

OR

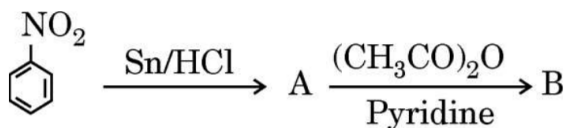
7(b). A first order reaction takes 24 minutes for 50% decomposition. Calculate the time required for 25% decomposition.

(Given: $\log 4 = 0.6021$, $\log 3 = 0.4771$)

8. (a) Which of the following is a secondary amine?

$\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$, $\text{CH}_3\text{CH}_2\text{NHCH}_2\text{CH}_3$, $\text{CH}_3\text{-N(CH}_3\text{)-C}_2\text{H}_5$

(b) Complete the following:



9. Write the systematic (IUPAC) names of the following on the basis of IUPAC rules:

(a) $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$

(b) $[\text{NiCl}_4]^{2-}$

(c) $\text{K}_3[\text{Fe}(\text{CN})_6]$

10(a). Account for the following:

- Transition elements show variable oxidation states.
- $E^\circ_{\text{Cu}^{2+}/\text{Cu}}$ value is highly positive.
- Cr^{2+} is a strong reducing agent.

OR

10(b). What is Lanthanoid contraction? Write its two consequences.

11. (a) Aromatic primary amines cannot be prepared by Gabriel Phthalimide synthesis. Why?

(b) Aniline is a weaker base than alkyl amines. Why?

(c) Arrange the following in the increasing order of basic strength in aqueous solution:

$(\text{CH}_3\text{CH}_2)_2\text{NH}$, $(\text{C}_2\text{H}_5)_3\text{N}$, $\text{C}_2\text{H}_5\text{NH}_2$

OR

12. Case Study (read the passage): A class of organic molecules which contain a carbon atom connected to an oxygen atom by a double bond is called Aldehydes and Ketones. It is called the carbonyl group. Aldehydes are prepared by the oxidation of alcohols. Formaldehyde is sold in an aqueous solution called formalin. Propanone, the simplest ketone, is commercially prepared by fermenting corn or by oxidation of propan-2-ol. Carboxylic acids also have carbonyl carbon. They can be prepared by the oxidation of alcohols and aldehydes.

Formic acid was first isolated by the distillation of red ants. It is partially responsible for the pain and irritation of ant and wasp stings. Aldehydes undergo many nucleophilic addition reactions. They can be reduced to primary alcohols. The aldehydes with α -hydrogen undergo aldol condensation and the aldehydes without α -hydrogen undergo Cannizzaro reaction.

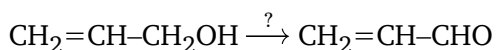
Ketones are highly reactive, although less so than aldehydes. Ketones are obtained by oxidation of secondary alcohols. Ketones possessing α -hydrogens also undergo aldol condensation. Carboxylic acids occur widely in nature and are used in the production of plastics, esters, etc. Aspirin is prepared from acetic acid. Similar to aldehydes and ketones, carboxylic acids can be halogenated at the α -carbon by reacting with a halogen in presence of phosphorus.

(a) Which of the following compounds would undergo aldol condensation?

Methanal, Benzaldehyde, Ethanal

(b) Write the chemical test to distinguish between propanal and propanone.

(c) Write the reagent required in the following reaction:



(d) (i) An alcohol 'A' ($\text{C}_3\text{H}_8\text{O}$) on oxidation gives compound 'B'. 'B' gives negative Tollens' test and reacts with hydrazine to give compound 'C'. 'B' reacts with NaOH and I_2 to give yellow precipitate of 'D'. Identify 'A', 'B', 'C' and 'D'.

12(d)(ii). (ii) Write the chemical reactions for the following:

(I) Clemmensen reduction

(II) HVZ reaction

- End of Question Paper -